

POIC Ground Command Procedures Book Volume 3: Payload Procedures, Increment 3

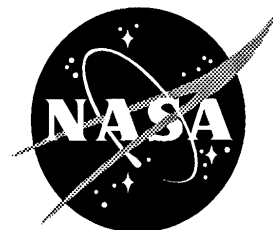
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INTERNATIONAL SPACE STATION PROGRAM
POIC GROUND COMMMAND PROCEDURES BOOK
VOLUME 3: PAYLOAD PROCEDURES
INCREMENT 3

CONCURRENCE

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INTERNATIONAL SPACE STATION
POIC GROUND COMMAND PROCEDURES BOOK
VOLUME 3: PAYLOAD PROCEDURES
INCREMENT 3

INITIAL RELEASE

MAY 4, 2001

Boeing Defense & Space Group
Missiles & Space Division
(a division of The Boeing Company)
Huntsville, Alabama

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ABSTRACT

This document provides the Payload Operations Integration Center (POIC) Ground Command Procedures book for use in supporting payload operations on the International Space Station (ISS). All command procedures to be executed at the Huntsville Operations Support Center (HOSC) shall be documented herein.

KEY WORDS

Human Research Facility

Microgravity Glovebox

Payload Support Systems

Physics of Colloids in Space

Protein Crystal Growth - Single Locker Thermal Enclosure System

Remote Triaxial System

Space Acceleration Measurement System

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INTERNATIONAL SPACE STATION PROGRAM
POIC GROUND COMMAND PROCEDURES BOOK
VOLUME 3: PAYLOAD PROCEDURES
INCREMENT 3

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SECTION 1, INTRODUCTION

1.1 PURPOSE

The Operations Data File (ODF) Control Board (CB), via the ODF Management Plan, has mandated that all operations affecting changes in onboard systems must be managed by the respective Partner's ODF CB. For ground commands originating from the Payload Operations Integration Center (POIC), that CB is the Payload Operations Data File (PODF) CB. The PODF CB has implemented the POIC Ground Command Procedures Book to facilitate the configuration control and management of ground commands originating from the POIC.

1.2 SCOPE

Ground command procedures are treated functionally identical to flight commanded activities in that specific procedures shall be developed to reflect all ground commanded activities that impact ISS resources. Specifically the following procedures are required:

- A. Payload procedures that may affect a payload safety or hazard control. These procedures may be nominal or malfunction and may or may not have associated error messages.
- B. Predefined payload ground malfunction procedures.
- C. Selected nominal payload ground procedures that are to be performed by the POIC cadre.
- D. Integrated payload rapid safing procedures.
- E. Nominal Payload Support ground command procedures.

Volume 1 of this document contains POIC-managed system procedures to support payload operations in the U.S. Lab. Volume 2 of this document contains POIC-managed EXPedite the PProcessing of Experiments to Space Station (EXPRESS) Rack procedures and Active Rack Isolation System (ARIS) procedures. Volume 3 of this document contains payload procedures.

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SECTION 2, PAYLOAD ACTIVATION/DEACTIVATION PROCEDURES

2.1. HRF RACK ACTIVATION/DEACTIVATION PROCEDURES

2.1.1. HRF RACK ACTIVATION

1. PLSS ACTIVATION

1.1. Thermal Control System (TCS) Resource Initiation

NOTE

1. PRO sets the RFCA flow setpoint to a value which will support HRF daily activity.
2. The RFCA flow setpoint will be kept as low as operationally possible to meet HRF requirements and minimize possible TCS delta pressure anomalies. After establishing the commanded setpoint, RFCA Closed Loop Control is inhibited in order to prevent undesirable interactions with the internal payload valves.
3. The nominal RFCA flow setpoint required to support HRF rack subsystems is 63.5 kg/hr (140 lb/hr). (This setpoint is recommended by PEI to help minimize possible delta pressure anomalies.)
4. The initial conditions of the RFCA may already be at the desired values. Step 1.1 may not be required.

Perform POIC Ground Command Procedures Vol. I, 2.2.2 SET RACK FLOW CONTROL ASSEMBLY (RFCA) FLOW SETPOINT, all, then:

CAUTION

Steps 1.2, 1.3 and 2.1 should be performed in quick succession to minimize the time the Rack operates without smoke detector monitoring.

1.2. Electrical Power System (EPS) Activation

NOTE

1. This step will be performed by the crew until ECLSS has access to the smoke detector monitor enable and inhibit commands.
2. PRO should monitor RPC status to determine when the crew has completed RPC activation
3. Expect possible caution "Lab MTL SFCA Uncontrolled DP-LAB".

Perform POIC Ground Command Procedures Vol. I, 2.1.2 RPC
CLOSE MAIN & SAFING (1 STEP FIRE), all, then:

NOTE

Wait 5 minutes for RIC to activate Payload Startup Notification.

1.3. Payload Startup Notification

Notify CPO to send PL startup notification to PLMDM

USL – HRF MAIN

√ POLL RIC - Green

√ DATA RIC - Green

2. RACK ACTIVATION

2.1. Enable Smoke Detector Monitoring

NOTE

This step will be performed by the crew until ECLSS has access to the
smoke detector monitor enable and inhibit commands.

USL – HRF MAIN

'Rack Power/Comm Parameters'

'Subsystem Power Performance'

'FDS'

√ Power - 01 (ON)

Request ECLSS Officer to begin monitoring services for rack smoke
detector.

2.2. Verify Smoke Detector Monitoring Enabled

USL – ECLSS Status

'Fire Detection and Suppression (FDS) Subsystem'

√ Monitor Status ON – Green (rack specific)

√ Smoke Detector Failed – Not orange

√ Fire Verified – Not orange

2.3. Verify Rack Health and Status

USL – HRF MAIN

'Rack TCS Parameters'

'TCS Temperature Sensors'

√All temperatures within ops range

'TCS Flow Sensors'

√FS 1 --- FS 4 – commanded values

NOTE

Refer to ON-HRF-SW-82. Incorrect fan speed displayed by PCS during Rack activation. Expect possible warning "LAB1S2 AAA Fan Undisrupted-LAB" may occur. Crew to ignore fan speed on PCS. ECLSS will suppress the warning during initial activation. PRO to monitor fan speed in Hz to ensure that it stays within limits. Range 40-303 Hz with nominal operating range @ 100 Hz

'Fan Speed'

√Fan Speed greater than or equal to 100 Hz

'Heart Beat'

√all heartbeats are incrementing

'Subsystem Power Performance'

√CH 0 ---2, 4---12 Power – 01 (ON)

√CH 0 --- 29 Fault – 00 (No Fault)

3. RACK THERMAL CONFIGURATION

NOTE

Expect possible caution "Lab MTL SFCA Uncontrolled DP-LAB".

3.1. HRF Valve Command

NOTE

This step may be omitted per THOR, PRO, and HRF discretion.

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HRF perform Thermal Configuration Command. Set internal valves to full open.

3.2. TCS Resource Adjustment

NOTE

1. If step 3.1 was omitted by HRF, this step is not required.
2. In this step the PRO adjusts the RFCA setpoint to account for the largest flow case setting that will be commanded by the crew during the day's activities. If the largest case to be commanded for the day is case 1 (A), then step 3.2 is not required.
3. $RFCA_{Flow} = Total\ Case_{Flow} \sim 10\% \text{ tolerance}$
4. The five thermal case settings available for HRF are as follows:

| HRF THERMAL FLOW CASES | | | | | |
|--|--------------------------------|--------------------------------|------------------------------------|---|--|
| Thermal Flow Case | Total Case Flow (kg/hr) | Total Case Flow (lb/hr) | F1 (Sub system Leg) (kg/hr) | F2 (8 drawer leg – right bank) (kg/hr) | F3 (7 drawer leg – left bank) (kg/hr) |
| 1 (A) | 27.2 | 60 | 27.2 | 0 | 0 |
| 2 (B) | 49.9 | 110 | 27.2 | 0 | 22.7 |
| 3 (C) | 59.0 | 130 | 27.2 | 0 | 31.8 |
| 4 (D) | 88.4 | 194 | 27.2 | 61.2 | 0 |
| 5 (E) | 115.6 | 254 | 27.2 | 61.2 | 27.2 |
| Components Cooled | | | | | |
| Case 1 (A) - Avionics (Subsystem only) | | | | | |
| Case 2 (B) - Avionics, GASMAP | | | | | |
| Case 3 (C) - Avionics, Workstation (WS) | | | | | |
| Case 4 (D) - Avionics, Ultrasound (U/S), Cooling Stowage Drawer 1 (CSD1) | | | | | |
| Case 5 (E) - Avionics, U/S, W/S, CSD1, CSD2 | | | | | |

Perform POIC Ground Command Procedures Vol. I, 2.2.2 SET RACK FLOW CONTROL ASSEMBLY (RFCA) FLOW SETPOINT, all.

3.3. HRF Valve Commanding

NOTE

1. The following step is performed by the ground or the crew.
2. For HRF checkout, the HRF ground controllers will set HRF to case D and the crew will command HRF to case B.

HRF perform Thermal Configuration Command. Set internal valves to settings for thermal flow case D.

2.1.2. HRF RACK DEACTIVATION

1. VERIFY ALL SUBRACK PAYLOADS DEACTIVATED

NOTE

1. The crew will deactivate any payload applications running on the laptop and will perform any manual shutdown procedures to the payloads that are required.
2. All subrack payload locations should have the power and communication port deactivated for a more controlled shutdown.

USL – HRF MAIN

'Rack Power/Comm Parameters'

√CH14 --- CH29 Power – 00 (OFF)

If drawer positions not powered off,

Inform OC

2. VERIFY RACK IN STANDBY MODE

USL – HRF MAIN

'Rack Mode'

√Rack Mode – 1 (Standby)

If rack not in standby mode,

Inform OC

CAUTION

Steps 3, 4, 5 and 6 should be performed in quick succession to minimize the time the Rack operates without smoke detector monitoring.

3. INHIBIT SMOKE DETECTOR MONITORING

NOTE

This step will be performed by the crew until ECLSS has access to the smoke detector monitor enable and inhibit commands.

Request ECLSS Officer to inhibit monitoring services for rack smoke detector.

4. VERIFY SMOKE DETECTOR MONITORING INHIBITED

USL – ECLSS Status

'Fire Detection and Suppression (FDS) Subsystem'

√Monitor Status ON – Not green (rack specific)

5. PAYLOAD SHUTDOWN NOTIFICATION

Notify CPO to send PL shutdown notification to PL MDM

USL – HRF MAIN

√POLL RIC – Not green

√DATA RIC – Not green

6. OPEN RPC MAIN AND SAFING

NOTE

1. This step will be performed by the crew until ECLSS has access to the smoke detector monitor enable and inhibit commands.

2. Expect possible caution "Lab MTL SFCA Uncontrolled DP_LAB".

Perform POIC Ground Command Procedure Vol. I, 2.1.2 RPC OPEN MAIN AND SAFING, all, then:

7. ADJUST THERMAL RESOURCES

NOTE

This step may or may not be required. PRO will coordinate with THOR to determine preferred RFCA settings following rack deactivation, which may result in closing the RFCA (THOR) or commanding the RFCA to a new setpoint (PRO/THOR).

Perform POIC Ground Command Procedures Vol. I, 2.2.2 SET RACK FLOW CONTROL ASSEMBLY (RFCA) FLOW SETPOINT, all.

2.2. SAMS ACTIVATION/DEACTIVATION PROCEDURES

2.2.1. SAMS ACTIVATION PROCEDURE

1. ACTIVATE THE ICU DRAWER (IN EXPRESS RACK 2)

NOTE

1. This procedure will power on the ICU and start data collection.
2. This procedure will require approximately five (5) minutes of crew time. The drawer main circuit breaker and the ICU laptop have to be physically powered on.
3. The two (2) switches on an RTS drawer may already be in the ON position even if the drawer does not have power.
4. If any RTS drawer and/or EE is already powered on, they must be power cycled by removing and then reapplying Rack power.
5. A command must be sent to each SE to start the data collection. Each SE will be set to the default of 1000 samples/second (the highest rate).

Perform POIC Ground Command Procedures Vol. II, 2.5.1 PAYLOAD DEVICE ACTIVATION/DEACTIVATION, all, then:

Have Crew perform steps 2-5 of MGUEEXPRSSAMSN005.

Wait six (6) minutes after ICU laptop initializes to complete time synch protocol.

2. ACTIVATE AN RTS DRAWER OR EE UNIT

2.1. Enable Power and Comm to RTS Drawer

Perform POIC Ground Command Procedures Vol. II, 2.5.1 PAYLOAD DEVICE ACTIVATION/DEACTIVATION, all, then:

If the two (2) switches on the RTS drawers are off,

Have Crew perform steps 2 and 3 of MGUEEXPRSSAMSN006.

2.2. Enable Power and Comm to EE

Perform POIC Ground Command Procedures Vol. II, 5.5.10 SAMS EE ACTIVATION/DEACTIVATION AND CURRENT OUTPUT RATING CONFIGURATION, all, then:

Wait five (5) minutes for the RTS and/or EE to initialize.

2.3. Activate SAMS SE DATA COLLECTION

| SE_ID VALUES | | |
|----------------|----------------------------|---------------------------|
| Unit | SE_ID = XXX- XXX(ASCII) | Location |
| SE w/RTS/D1 | 121-f02 | Inside RTS/D1 |
| SE w/RTS/D1 | 121-f03 | UIP under ER2 |
| SE w/RTS/D2 | 121-f04 | UIP under ER1 |
| SE w/RTS/D2 | 121-f05 | Light Tray over ER2 |
| SE w/EE in ER2 | 121-f06 | On EXPPCS Test Section |

NOTE

Using a standard Command Update Form, prepare the following command for each SE:

Launchpad

Sel Operation

Sel Command Operations

Command Operations

'Command Mnemonic'

Highlight Command – SAMS_START_SE

'Update Command (command name: Untitled)'

√Field ADJUSTMENTS = 0700 (hex)

√Field CHECK_SUM = 1111 (hex)

√Field GAIN_CODE = 0100 (hex)

√Field PSWD = *** (ASCII)

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√Field RATE_CODE = 0400 (hex)

√Field SEQ_NUM = 9709 hex

√Field SE_ID = **xxx-xxx** (ASCII) (use table above for values)

√Field UNIT_CODE = 0300 hex

Sel Update

| |
|--------------------|
| Command Operations |
|--------------------|

Sel Uplink

Notify SAMS that the system has been powered on and data collection has begun.

2.2.2. SAMS DEACTIVATION PROCEDURE

1. DEACTIVATE THE ICU DRAWER (EXPRESS RACK 2)

NOTE

1. This command will stop the computer processes on all the RTS systems, including those in different racks.
2. This command will turn off the ICU laptop and put the drawer's main circuit breaker in the OFF position.
3. The 2 fan switches inside the drawer front will remain in the ON position.

1.1. Shut Down SAMS ICU

NOTE

Using a standard Command Update Form, prepare the following command.

Launchpad

Sel Operation

Sel Command Operations

Command Operations

'Command Mnemonic'

Highlight Command – SAMS_SHUTDOWN_ICU

'Update Command (command name: Untitled)'

√Field CHECK_SUM = 1111 (hex)

√Field PSWD = *** (ASCII)

√Field SEQ_NUM = 9909 (hex)

Sel Update

Command Operations

Sel Uplink

Wait two (2) minutes (for the ICU and RTS processes to be halted).

Repeat step 1.1 Shutdown SAMS ICU within five (5) minutes.

1.2. Remove Power and Comm From SAMS ICU

Perform POIC Ground Command Procedures Vol. II 2.5.1 PAYLOAD
DEVICE ACTIVATION/DEACTIVATION, all, then:

Notify SAMS that the system has been powered off.

2. DEACTIVATE AN INDIVIDUAL RTS DRAWER OR EE UNIT

NOTE

1. This command will stop the computer processes on an RTS system (drawer or EE).
2. There are two (2) RTS drawers (both in Express Rack 1) and one (1) EE inside of the ARIS Express Rack 2.
3. The power and fan switches on the drawer front will remain in the ON position.
4. Use table below for device ID.

| Device ID Table | | |
|-----------------|------------------------------|-----------------|
| Unit | DEVICE_ID=XXX-XXX (ASCII) | Location |
| RTS/D1 | 122-f02 | ER1, Drawer 1 |
| RTS/D2 | 122-f03 | ER2, Drawer 2 |
| EE | 122-f05 | ER2, Channel 13 |

2.1. Shut Down SAMS RTS or EE Unit

Launchpad

Sel Operation

Sel Command Operations

Command Operations

'Command Mnemonic'

Highlight Command – SAMS_SHUTDOWN_RTS

'Update Command (command name: Untitled)'

√Field CHECK_SUM = 1111 (hex)

√Field DEVICE_ID = **xxx-xxx** (ASCII) (Use table above for values)

√Field PSWD = *** (ASCII)

√Field SEQ_NUM = 9809 (hex)

Sel Update

Command Operations

Sel Uplink

2.2. Remove Power and Comm to RTS Drawer

Perform POIC Ground Command Procedures Vol. II 2.5.1 PAYLOAD DEVICE ACTIVATION/DEACTIVATION, all, then:

Notify SAMS that an RTS drawer has been powered off.

2.3. Remove Power and Comm to EE Unit

Perform POIC Ground Command Procedures Vol. II 5.5.10 SAMS EE ACTIVATION/DEACTIVATION AND CURRENT OUTPUT RATING CONFIGURATION, all, then:

Notify SAMS that an EE has been powered off.

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SECTION 3, PAYLOAD RAPID SAFING PROCEDURES

3.1. HRF RACK 1 SAFING PROCEDURES

3.1.1. SAFE HRF USING DISPLAY

NOTE

1. This procedure stops all telemetry, returns the Rack to its initial state, and then shuts down the Rack.
2. These steps do not have any needed pauses; just proceed through the steps without delay.

1. REMOVE SAFING POWER FROM HRF

USL-SAFING
'HRF'

NOTE

1. Selecting the SAFING button will initiate a script that allows the operator to shut off SAFING POWER to the HRF Rack.
2. The name of the command is LAPR96IM1157K.
3. Expect possible caution "Lab MTL SFCA Uncontrolled DP-LAB".

Sel SAFING

2. REMOVE MAIN POWER FROM HRF

USL-SAFING
'HRF'

NOTE

1. Selecting the MAIN button will initiate a script that allows the operator to shut off MAIN POWER to the HRF Rack.
2. The name of the command is LAPR96IM0253K.

Sel MAIN

3.1.2. SAFE HRF MANUALLY

1. REMOVE POWER FROM HRF (LABS2)

Perform POIC Ground Command Procedure Vol. I, 2.1.2 RPC OPEN MAIN AND SAFING (1 STEP FIRE), all, then:

2. ADJUST THERMAL RESOURCES

NOTE

1. This step may or may not be required. PRO will coordinate with THOR to determine preferred RFCA settings following rack deactivation, which may result in closing the RFCA (THOR) or commanding the RFCA to a new setpoint (PRO/THOR).
2. Expect possible caution "Lab MTL SFCA Uncontrolled DP-LAB".

Perform POIC Ground Command Procedures Vol. I, 2.2.2 SET RACK FLOW CONTROL ASSEMBLY (RFCA) FLOW SETPOINT, all.

3.2. MAMS SAFING PROCEDURE

3.2.1. SAFE MAMS USING DISPLAY

| CAUTION |
|---|
| 1. IAW ON-EXPRESS-SW-27. |
| 2. If MAMS is shut down while comm is still enabled, before MAMS can be brought back up comm must be disabled and re-enabled. |
| 3. This caution note will remain in effect until the Operations Note has been resolved. |

USL – SAFING

'EXPRESS RACK 1'

| NOTE |
|--|
| 1. Selecting the MAMS button will initiate a script that allows the operator to safe this payload. |
| 2. The name of the script is E1_safe_MAMS. |

Sel MAMS

3.2.2. SAFE MAMS MANUALLY

1. REMOVE POWER FROM MAMS

| CAUTION |
|---|
| 1. IAW ON-EXPRESS-SW-27. |
| 2. If MAMS is shut down while comm is still enabled, before MAMS can be brought back up comm must be disabled and re-enabled. |
| 3. This caution note will remain in effect until the Operations Note has been resolved. |

| <u>NOTE</u> |
|--|
| MAMS does not require any commands to be sent prior to deactivation. The power can be removed at any time. |

Perform POIC Ground Command Procedure Vol. II, 2.1.7 SUBRACK PAYLOAD DEACTIVATION.

3.3. EXPPCS SAFING PROCEDURE

3.3.1. SAFE EXPPCS USING DISPLAY

USL – SAFING
'EXPRESS RACK 2'

NOTE

1. Selecting the EXPPCS button will initiate a script that allows the operator to safe this payload.
2. The name of the script is E2_safe_EXPPCS.

Sel EXPPCS

3.3.2. SAFE EXPPCS MANUALLY

1. RETRIEVE STORED DATA

Launchpad

Sel Operation

Sel Command Operations

Command Operations

'Command Mnemonic'

Highlight Command – CMD_SHELL

'Update Command (command name: Untitled)'

√CID - 0200 (hex)

√CSN - 00000000 (hex)

√DATA01 - 00 (hex)

thru

√DATA90 - 00 (hex)

Sel Update

Command Operations

Sel Uplink

NOTE

Wait 5 minutes for data to be stored. The power and comm can be removed to the three locker positions.

2. REMOVE POWER FROM EXPPCS

Perform POIC Ground Command Procedure Vol. II, 2.1.7 SUBRACK PAYLOAD DEACTIVATION.

3.4. SAMS II ICU AND RTS DRAWER SAFING PROCEDURE

3.4.1. SAFE SAMS USING DISPLAY

USL – SAFING

'EXPRESS RACK 2'

NOTE

1. Selecting the SAMS ICU/D1 button will initiate a script that allows the operator to safe this payload.
2. The script will safe SAMS RTS/D1 and SAMS RTS/D2.
3. The name of the script is E2_safe_SAMSICU.

Sel SAMS ICU/D1

3.4.2. SAFE SAMS MANUALLY

1. DEACTIVATE THE ICU DRAWER (EXPRESS RACK 2)

NOTE

1. This command will stop the computer processes on all the RTS systems, including those in different racks.
2. This command will turn off the ICU laptop and put the drawer's main circuit breaker in the OFF position.
3. The 2 fan switches inside the drawer front will remain in the ON position.

1.1. Shut Down SAMS ICU

Launchpad

Sel Operation

Sel Command Operations

Command Operations

'Command Mnemonic'

Highlight Command – SAMS_SHUTDOWN_ICU

Command Operations

Sel Update

'Update Command (command name: Untitled)'

√CHECK_SUM - 1111 (hex)

√PSWD - *** (ASCII)

√SEQ_NUM - 9909 (hex)

Sel Update

Command Operations

Sel Uplink

Wait two (2) minutes for process to be halted.

NOTE

Uplink same command within 5 minutes. Then power can be removed.

1.2. Remove Power to SAMS ICU

Perform POIC Ground Command Procedure Vol. II, 2.1.7 SUBRACK PAYLOAD DEACTIVATION.

2. DEACTIVATE AN INDIVIDUAL RTS DRAWER OR EE UNIT

NOTE

1. This command will stop the computer processes on an RTS system (drawer or EE).
2. There are two (2) RTS drawers (both in EXPRESS Rack 1) and one (1) EE inside of the ARIS EXPRESS Rack 2.
3. The power and fan switches on the drawer front will remain in the ON position.
4. Use table below for device ID.

| Unit | DEVICE_ID=XXX-XXX (ASCII) | Location |
|--------|------------------------------|-----------------|
| RTS/D1 | 122-f02 | ER1, Drawer 1 |
| RTS/D2 | 122-f03 | ER2, Drawer 2 |
| EE | 122-f05 | ER2, Channel 13 |

2.1. Shut Down SAMS RTS or EE Unit Using Command Update Form

Launchpad

Sel Operation

Sel Command Operations

Command Operations

'Command Mnemonic'

Highlight Command – SAMS_SHUTDOWN_RTS

Command Operations

Sel Update

'Update Command (command name: Untitled)'

√CHECK_SUM = 1111 (hex)

√DEVICE_ID = **xxx-xxx** (ASCII) use table above for values:

√PSWD = *** (ASCII)

√SEQ_NUM = 9809 (hex)

Sel Update

| |
|--------------------|
| Command Operations |
|--------------------|

Sel Uplink

2.2. Remove Power and Comm. to RTS Drawer

Perform POIC Ground Command Procedures Vol. II 2.1.7 SUBRACK PAYLOAD DEACTIVATION, all, then:

Notify SAMS that an RTS drawer has been powered off

2.3. Remove Power and Comm. to EE unit

Perform POIC Ground Command Procedures Vol. II 5.5.10 SAMS EE ACTIVATION/DEACTIVATION AND CURRENT OUTPUT RATING CONFIGURATION, all, then:

Notify SAMS that an EE has been powered off.

3.5. APCF SAFING PROCEDURE

3.5.1. SAFE APCF USING DISPLAY

USL – SAFING
'EXPRESS RACK 1'

NOTE

1. Selecting the APCF button will initiate a script that allows the operator to safe this payload.
2. The name of the script is E1_safe_APCF.

Sel APCF

3.5.2. SAFE APCF MANUALLY

1. REMOVE POWER FROM APCF

NOTE

APCF does not require any commands to be sent prior to deactivation. The power can be removed at any time.

Perform POIC Ground Command Procedure Vol. II, 2.1.7 SUBRACK PAYLOAD DEACTIVATION.

3.6. BTR SAFING PROCEDURE

3.6.1. SAFE BTR USING DISPLAY

USL – SAFING
'EXPRESS RACK 1'

NOTE

1. Selecting the BTR button will initiate a script that allows the operator to safe this payload.
2. The name of the script is E1_safe_BTR.

Sel BTR

3.6.2. SAFE BTR MANUALLY

1. REMOVE POWER FROM BTR

NOTE

BTR does not require any commands to be sent prior to deactivation.
The power can be removed at any time.

Perform POIC Ground Command Procedure Vol. II, 2.1.7 SUBRACK
PAYLOAD DEACTIVATION.

3.7. DCPCG SAFING PROCEDURE

3.7.1. SAFE DCPCG USING DISPLAY

NOTE

1. If both lockers are to be safed then power down the C-locker before the V-locker.
2. If V-locker locker loses power then the C-locker will also have to be powered down.
3. If the C-locker loses power the V-locker can remain on.

USL – SAFING

'EXPRESS RACK 1'

1. SAFE DCPCG C LOCKER

NOTE

1. Selecting the DCPCG-C button will initiate a script that allows the operator to safe this payload.
2. The name of the script is E1_safe_DCPCG-C.

Sel DCPCG-C

2. SAFE DCPCG V LOCKER

NOTE

1. Selecting the DCPCG-V button will initiate a script that allows the operator to safe this payload.
2. The name of the script is E1_safe_DCPCG-V.

Sel DCPCG-V

3.7.2. SAFE DCPCG MANUALLY

NOTE

1. If both lockers are to be safed then power down the C-locker before the V-locker.
2. If V-locker locker loses power then the C-locker will also have to be powered down.
3. If the C-locker loses power the V-locker can remain on.

1. **REMOVE POWER FROM DCPCG C AND V LOCKERS**

NOTE

DCPCG does not require any commands to be sent prior to deactivation. The power can be removed at any time.

Perform POIC Ground Command Procedure Vol. II, 2.1.7 SUBRACK PAYLOAD DEACTIVATION.

3.8. BSTC SAFING PROCEDURE

3.8.1. SAFE BSTC USING DISPLAY

USL – SAFING
'EXPRESS RACK 4'

NOTE

1. Selecting the BSTC button will initiate a script that allows the operator to safe this payload.
2. The name of the script is E4_safe_BSTC1.

Sel BSTC

3.8.2. SAFE BSTC MANUALLY

1. REMOVE POWER TO BSTC

NOTE

BSTC does not require any commands to be sent prior to deactivation. The power can be removed at any time.

Perform POIC Ground Command Procedure Vol. II, 2.1.7 SUBRACK PAYLOAD DEACTIVATION.

3.9. ARIS ICE SAFING PROCEDURE

3.9.1. SAFE ARIS ICE USING DISPLAY

USL – SAFING

'EXPRESS RACK 2'

NOTE

1. Selecting ARIS POP will initiate a script that allows the operator to safe this payload.
2. The name of the script is E2_safe_ARISPOP.

Sel ARIS POP

USL – SAFING

'EXPRESS RACK X (X denotes Rack that supports the ARIS Shaker)'

NOTE

1. Selecting ARIS SHKR will initiate a script that allows the operator to safe this payload.
2. The name of the script is EX_safe_ARISSHKR.

Sel ARIS SHKR

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3.9.2. SAFE ARIS ICE MANUALLY

NOTE

ARIS ICE does not require any commands to be sent prior to deactivation. The power can be removed at any time.

Perform POIC Ground Command Procedures Vol. II, 2.1.7. SUBRACK
PAYLOAD DEACTIVATION.

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SECTION 4, PAYLOAD MALFUNCTION PROCEDURES

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SECTION 5, PAYLOAD CORRECTIVE PROCEDURES

NOTE

The word RESET will appear under the SET/RESET column.

√DISC 32 A Locker 8 – RESET

IF DISC 32 A Locker 8 not RESET

Notify EXPPCS PD.

NOTE

The word SET will appear under the SET/RESET column.

√DISC 32 A Locker 8 – SET

NOTE

The word RESET will appear under the SET/RESET column.

√DISC 32 A Locker 8 – RESET

IF DISC 32 A Locker 8 not RESET

Notify OC

Contact CPO for command status

5. VERIFY EXPPCS HEALTH AND STATUS

NOTE

After the EXPPCS hardware is reset, it will take approximately 10 minutes before H&S data is received.

NOTE

The discrete number 34 (channel B) should toggle between SET and RESET when EXPPCS hardware has been reset.

√DISC 34 B Locker 8 – toggling between SET and RESET

IF DISC 34 B Locker 8 not toggling

Notify EXPPCS PD

5.2. DCPCG CORRECTIVE PROCEDURES

5.2.1. DCPCG ENABLE DOWNLINK

NOTE

In event rack telemetry is enabled, the following command must be sent by POIC/PRO.

After EXPRESS Rack telemetry is enabled, perform the following fixed command:

Launchpad

Sel Operation

Sel Command Operations

Command Operations

'Command Mnemonic'

Highlight Command – DOWNLINK_ENABLE

'Update Command (command name: Untitled)'

Sel Update

Command Operations

Sel Uplink

5.2.2. DCPCG INHIBIT DOWNLINK

NOTE

In event EXPRESS Rack telemetry is disabled, the following command must be sent by POIC/PRO.

Prior to EXPRESS Rack telemetry being disabled, perform the following fixed command:

Launchpad

Sel Operation

Sel Command Operations

Command Operations

'Command Mnemonic'

Highlight Command – DOWNLINK_INHIBIT

'Update Command (command name: Untitled)'

Sel Update

Command Operations

Sel Uplink

5.2.3. DCPCG RESET C LOCKER 1

NOTE

This procedure is performed upon request of PD.

1. SEND EXPRESS COMMAND TO REMOVE POWER TO C-LOCKER RACK LOCATION
Perform POIC Ground Command Procedure Vol. II, 2.5.1 PAYLOAD DEVICE ACTIVATION/DEACTIVATION, step 3, then:
2. SEND EXPRESS COMMAND TO ENABLE POWER TO C-LOCKER RACK LOCATION
Perform POIC Ground Command Procedure Vol. II, 2.5.1 PAYLOAD DEVICE ACTIVATION/DEACTIVATION, steps 1 and 2, then:
3. NOTIFY PD RESET OF C-LOCKER COMPLETE

5.2.4. DCPCG RESET V LOCKER 1

NOTE

This procedure is performed upon request of PD.

1. SEND EXPRESS COMMAND TO REMOVE POWER TO V-LOCKER RACK LOCATION
Perform POIC Ground Command Procedure Vol. II, 2.5.1 PAYLOAD DEVICE ACTIVATION/DEACTIVATION, step 3, then:
2. WAIT 1 MINUTE
3. SEND EXPRESS COMMAND TO ENABLE POWER AND COMMUNICATIONS TO V-LOCKER RACK LOCATION
Perform POIC Ground Command Procedure Vol. II, 2.5.1 PAYLOAD DEVICE ACTIVATION/DEACTIVATION, steps 1 and 2, then:
4. NOTIFY PD RESET OF V-LOCKER COMPLETE

5.2.5. DCPCG RESTART C LOCKER 1

NOTE

1. All DCPCG commands are sent by the POIC/PRO after power to rack is restored.
2. This procedure restarts C-Locker telemetry and continues with science experiments.

1. EXECUTE THE DCPCG RESTART V-LOCKER PROCEDURE TO RESTART THE V-LOCKER RACK LOCATION

Perform POIC Ground Command Procedure Vol. III, 5.2.6 DCPCG RESTART V LOCKER1, all, then:

2. SEND EXPRESS COMMAND TO ENABLE POWER AND COMMUNICATIONS TO C-LOCKER RACK LOCATION

Perform POIC Ground Command Procedure Vol. II, PAYLOAD DEVICE ACTIVATION/DEACTIVATION, steps 1 and 2, then:

5.2.6. DCPCG RESTART V LOCKER 1

NOTE

Power to V-Locker rack location is restored through EXPRESS Rack command.

1. SEND EXPRESS COMMAND TO ENABLE POWER AND COMMUNICATIONS TO V-LOCKER RACK LOCATION

Perform POIC Ground Command Procedure Vol. II, PAYLOAD DEVICE ACTIVATION/DEACTIVATION, steps 1 and 2, then:

5.2.7. DCPCG POWER DOWN C LOCKER 1

NOTE

1. This procedure stops C-Locker telemetry and shuts down the C-Locker.
2. Power to C-Locker is removed through EXPRESS Rack command.
3. The C-Locker can be shut down safely with a simple removal of power from the EXPRESS Rack.

1. SEND EXPRESS COMMAND TO REMOVE POWER TO C-LOCKER RACK LOCATION

Perform POIC Ground Command Procedure Vol. II, PAYLOAD DEVICE ACTIVATION/DEACTIVATION, step 3.

5.2.8. DCPCG POWER DOWN V LOCKER 1

NOTE

1. This procedure stops V-Locker telemetry and shuts down the V-Locker thermal carrier.
2. Power to V-Locker rack location is removed through EXPRESS Rack command.
3. The V-Locker thermal carrier can be shut down safely with a simple removal of power from the EXPRESS Rack.

1. SEND EXPRESS COMMAND TO REMOVE POWER TO V-LOCKER RACK LOCATION

Perform POIC Ground Command Procedure Vol. II, PAYLOAD DEVICE ACTIVATION/DEACTIVATION, step 3.

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SECTION 6, PAYLOAD NOMINAL PROCEDURES

6.1. EXPPCS NOMINAL PROCEDURES

6.1.1. EXPPCS COMMAND EXECUTE

NOTE

1. This procedure is to be used by the PRO to send the EXPPCS shell command.
2. This shell command is used only in the event that commands cannot be issued by the EXPPCS team at GRC, but the POIC can still issue commands. This procedure would be used to issue time-critical commands only.
3. The values for the modifiable fields will be supplied by the EXPPCS team to the PRO on a case-by-case basis.

Launchpad

Sel Operation

Sel Command Operations

Command Operations

'Command Mnemonic'

Highlight Command – CMD_SHELL

'Update Command (command name: Untitled)'

NOTE

Enter field input information as provided by the PD.

Sel Update

Command Operations

Sel Uplink

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APPENDIX A
ABBREVIATIONS AND ACRONYMS

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A, ABBREVIATIONS AND ACRONYMS

| | |
|-----------------|---|
| ΔP_{wv} | Change in Pressure with respect to the work volume |
| ACT | Activation |
| AOS | Acquisition of Signal |
| ARIS | Active Rack Isolation System |
| C | Celsius |
| CB | Control Board |
| CMD | Command |
| Deg | Degrees |
| DRR | Document Release Record |
| EE | Electronic Enclosure |
| EHS | Enhanced HOSC System |
| EXPPCS | EXPeriment Physics of Colloids in Space |
| EXPRESS | EXpedite the PROcessing of Experiments to Space Station |
| GND | Ground |
| Hex | Hexadecimal |
| HOSC | Huntsville Operations Support Center |
| HRF | Human Resource Facility |
| ICU | Interim Control Unit |
| ISS | International Space Station |
| LA | Laboratory (U.S.) |
| LED | Light Emitting Diode |
| mBar | Milibar |
| MCC-H | Mission Control Center-Houston |
| MSG | Microgravity Science Glovebox |
| OC | Operations Control |
| ODF | Operations Data File |
| OPS | Operations |
| PCG-STES | Protein Crystal Growth - Single Locker Thermal Enclosure System |
| PIMS | Payload Information Management System |
| PLSS | Payload Support System |
| PODF | Payload Operations Data File |

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| | |
|---------|--|
| POIC | Payload Operations Integration Center |
| PRO | Payload Rack Officer |
| Re-init | Reinitiate |
| RTS | Remote Triaxial System |
| SAMS | Space Acceleration Measurement System |
| SE | System Enclosure |
| Sel | Select |
| Seq | Sequence |
| STES | Single Locker Thermal Enclosure System |
| TBD | To Be Determined |
| TCS | Thermal Control System |
| Temp | Temperature |
| U.S. | United States |
| WS | Work Station |